

We Claim:

- 5 1. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]alkane of formula (I)



(I)

10 in which

$$1 \leq n \leq 8,$$

15 $0 \leq m \leq 2$ for $n = 1$ or 2 ,

$$0 \leq m \leq 4$$
 for $3 \leq n \leq 8$,

20 $1 \leq x \leq 12$,

$$0 \leq y \leq 2, \text{ and}$$

where R_1 and R_2 are each independently fluorine, hydrogen, alkyl,
fluoroalkyl or perfluoroalkyl,

25 and each substituent $(C_nF_{2n+1-m}H_m)$ and the number Y of the substituents
on phosphorus centers PF_{4-y} are each independently selected,

30 with the proviso that perfluoro-1,2-
bis(diethyldifluorophosphorano)ethane is excluded.

2. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1, wherein $1 \leq n \leq 6$.

3. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1, wherein $1 \leq n \leq 3$.

4. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1 wherein $1 \leq x \leq 8$.

5. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1 wherein $1 \leq x \leq 4$.

6. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1 wherein $m = 0$.

7. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according claim 1, wherein $y = 2$.

8. A fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane according to claim 1, wherein R_1 and R_2 are fluorine.

9. A process for the preparation of a fluoro- α,ω -bis[(fluoroalkyl)fluorophosphorano]]alkane of formula (I)



(I)

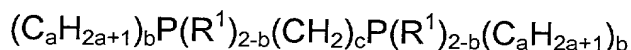
in which $1 \leq n \leq 8$, $0 \leq m \leq 2$ for $n = 1$ or 2 , $0 \leq m \leq 4$ for $3 \leq n \leq 8$, $1 \leq x \leq 12$, $0 \leq y \leq 2$, and

where R_1 and R_2 are each independently fluorine, hydrogen, alkyl, fluoroalkyl or perfluoroalkyl, and

and each substituent ($C_nF_{2n+1-m}H_m$) and the number Y of the substituents on the phosphorus centers PF_{4-y} are each independently selected,

said process comprising converting at least one α,ω -bis(alkylphosphino)alkane into at least one compound of formula (I) by electrolysis in hydrogen fluoride, and optionally purifying and/or isolating a compound of formula I.

10. The process according to Claim 9, comprising converting at least one compound of formula (II)



(II)

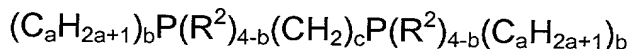
in which $R^1 = H, Cl$ or F ,

$1 \leq a \leq 8$,

$b = 0, 1$ or 2 and

$1 \leq c \leq 12$,

and/or at least one compound of formula (III)



(III)

in which $R^2 = Cl$ or F ,

$1 \leq a \leq 8$,

b = 0, 1 or 2 and

$1 \leq c \leq 12$,

and where ligands (C_aH_{2a+1}), and R^1 and R^2 in the compounds (II) and/or (III) are each independently selected,

into a compound of formula (I) by electrolysis in hydrogen fluoride, and optionally purifying and/or isolating a compound of formula (I).

11. The process according to claim 9, wherein electrolysis is carried out at a temperature from -20 to $+40^\circ\text{C}$.
12. The process according to claim 9, wherein electrolysis is carried out at an excess pressure of from 0 to 3 bar above atmospheric pressure.
13. The process according to claim 9, wherein electrolysis is carried out at a voltage of from 4 to 8 volts.
14. The process according to claim 9, wherein electrolysis is carried out at a current density of from 0.2 to 5 A/dm^2 .
15. The process according to claim 9, comprising purifying or isolating a compound of formula (I) by extraction, phase separation, distillation or by a combination thereof.
16. The process according to claim 9 wherein electrolysis is carried out using a positive electrode containing nickel.